

Report for 2002NY3B: Septic System Pollution Prevention BMPs: Development of Public Outreach Approaches, Assessment, and Decision-Making Tools for Local Government

There are no reported publications resulting from this project.

Report Follows:

Problem & Research Objectives: Irvine and Pettibone (1993) found that bacteria sources in the upper watershed (a mix of forest, agriculture, rural residential, and small town land uses) potentially had a greater impact on water quality than the CSOs. Subsequent projects (Irvine and Pettibone, 1996; Wills and Irvine, 1996) confirmed that upper watershed sources, particularly in association with storm events, produced high levels of fecal coliforms in the three major tributaries to the Buffalo River (often in the range of 10,000-30,000 cfu/100 mL). One of the principal bacteria sources in the upper watershed appears to be failing septic systems.

Although septic systems appear to be an important bacteria source within the upper watershed, tools/approaches have not been developed to assess problems within specific reaches or the potential effects of improved septic practices on water quality. The proposed research will assist Erie County in refining its outreach regarding septic practices, assess the effectiveness of such outreach, and provide decision-making tools to evaluate the effects of septic system programs on receiving water quality.

The objective of the research essentially is to develop a program that optimizes public outreach and decision-making on a watershed basis and thereby maximizes water quality benefits from implementation of septic system BMPs. The research will focus on two areas, one being the delivery and assessment of a county level outreach program related to appropriate septic construction and maintenance; and the other being application of computer-oriented tools (GIS, remote sensing, water quality modeling) to help county personnel identify problem source-areas and evaluate the potential impact of septic remediation on receiving water quality.

Methodology:

One workshop on proper septic system construction and maintenance already has been sponsored by the Erie County Water Quality Coordinating Committee and its member agencies. A short video produced by Cornell University started the program and provided the participants with a basic understanding of their system. The information was augmented with three short presentations addressing soil considerations, septic system design and standards, health implications of failing systems, causes of septic failure and how to recognize problems, and the costs associated with installation, replacement and repair.

A survey instrument will be developed and mailed to assess attitude and changes in behavior that can be associated with workshop participation. Data on attendee perspectives regarding the type of assistance that would help ensure appropriate and safe septic practice (including the necessary level and type of assistance), intervention models, and future needs also will be collected, analyzed, and widely disseminated for discussion and planning purposes.

Through this proposal, two additional septic workshops will be held in fall, 2002, and spring, 2003, with an identical format to the Cazenovia Creek workshop.

A web page will be added to the Erie County DEP home site that provides general information about septic systems as well as the literature distributed at the workshops in an Adobe Acrobat readable format.

Bacteria Source Assessment Tools. As a first step in identifying potential source-areas of septic system discharge, ArcView GIS will be used to identify areas within the Buffalo River watershed that are serviced by municipal/county treatment plants and those that are not.

Locations of the septic source-areas will be input to a mathematical model to evaluate septic abatement scenarios.

As part of a different project, our group already has calibrated the hydrologic component of the NPSM/HSPF model for each of the three tributaries using observed daily mean flow data from USGS gauge stations for three different years (1990, 1992, 1995) with satisfactory results (Perrelli and Irvine, 2001). In the proposed work, we will review the literature to determine representative flow rates from individual septic systems.

Principal Findings & Significance:

The project is ongoing and has been granted a no-cost extension until August 31, 2003. The following are highlights of work that has been completed and work remaining:

Our workshop assessment questionnaire was developed, in consultation with the Erie County office of the Natural Resources Conservation Service, Erie County Health Department, Erie County Department of Environment and Planning, and Erie County Soil and Water Conservation District.

Our first septic system workshop was conducted in the town of Sardinia on the evening of November 19, 2002 and it was attended by a total of 60 area citizens. The assessment questionnaire was distributed to the attendees and they were asked to complete it and hand it in at the end of the workshop. We asked that only one questionnaire be completed per family and a total of 24 questionnaires were returned that evening.

The Erie County Water Quality Committee had sponsored septic system workshops in other towns of the Buffalo River watershed during the past year and a half, prior to the development of our assessment questionnaire. We obtained the sign in/mailling list of attendees for the previous workshops and mailed our questionnaire. The list contained 80 names/addresses and to date we have received 46 completed questionnaires and 3 mailings were returned as undeliverable.

We have entered the questionnaire responses into an Excel spreadsheet and have begun summarizing results.

As a first step to developing the modeling tool for the bacteria loading estimates from septic systems in the Buffalo River watershed, we have identified buildings and their characteristics (e.g. floor space and/or number of bedrooms) within a 300 ft. buffer around the tributary streams within the watershed. Septic system discharge permit information for the commercial, industrial, and institutional facilities within the 300 ft. buffer have been obtained from the NYS DEC. Loadings from residences to their septic systems will be estimated based on a literature review that identified per capita/per bedroom wastewater discharge volume per day and a representative range for fecal coliform level.

As noted in our proposal, the hydrologic component of the BASINS version of NPSM/HSPF had previously been calibrated. This calibration was done using BASINS version 2 and we have updated all files to run in BASINS version 3. BASINS will be used to route

bacteria loadings through the tributaries to determine the potential impact of different septic system abatement options on water quality.

Remaining Work:

Conduct our second and final septic system workshop and apply the assessment questionnaire. This workshop will be held in the town of Alden at the end of March.

Complete the analysis of the assessment questionnaires.

Complete the septic system abatement scenario analysis using BASINS and train Erie County Department of Environment and Planning personnel to run the model.

Construct the informational web page in association with Erie County Department of Environment and Planning.

Complete the final report.

Students working on the project will present results at the Great Lakes Regional Pollution Prevention Roundtable meeting, Erie, PA, in early August.

References:

Irvine, K. N. and G. W. Pettibone. 1993. Dynamics of indicator bacteria populations in sediment and river water near a combined sewer outfall, Buffalo River, New York. *Environmental Technology*, 14: 531-542.

Irvine, K. N. and G. W. Pettibone. 1996. Planning level evaluation of indicator bacteria densities and sources in a mixed land use watershed. *Environmental Technology* 17: 1-12.

Perrelli, M. F. and K. N. Irvine. 2001. Receiving Water Modeling – Buffalo River; Interim Report on Hydrologic Calibration and Validation. Report to URS Greiner, Buffalo, NY, 62p.

Wills, M. and K. N. Irvine. 1996. Application of the National Sanitation Foundation Water Quality Index to the Cazenovia Creek pilot watershed management study. *Middle States Geographer*, 29: 95-104.